

Elbow Fractures with Instability Evaluation and Treatment Strategies

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KEYWORDS

• Elbow • Fracture • Dislocation • Instability • ORIF

KEY POINTS

- Initial management of elbow fracture dislocations include evaluation of the shoulder and wrist, neurovascular examination, and assessment of the skin for open wounds. If grossly dislocated, a preliminary reduction is recommended.
- Elbow fractures with ulnohumeral instability tend to occur in 5 general patterns: (1) terrible triad, (2) varus posteromedial rotatory instability, (3) olecranon fracture dislocation, (4) radial head fracture with ulnohumeral dislocation, and (5) lateral column fracture of the distal humerus with ulnohumeral dislocation.
- Loose or incompetent repair of the collaterals and/or not repairing small coronoid fractures are common causes of residual instability after repair.
- There is no consensus regarding the management of the ulnar nerve; however, the nerve should be managed thoughtfully.
- A stiff, congruent elbow is preferable to an unstable elbow. If intraoperative instability after repair persists, external fixation, internal hinge, or internal static fixation are recommended.

INTRODUCTION

The treatment of elbow fractures with ulnohumeral instability is in evolution. In the past, unstable elbow fractures were considered as variations of the same injury, but more recently, computed tomography (CT) scans have helped us recognize that there are distinct groups of fracture patterns. These patterns help predict what structures are injured and guide treatment.

Improvements in radial head arthroplasty, soft tissue repair, and spanning implant technologies are also important in better outcomes. Midterm results are substantially improved than in the past; however, long-term outcomes are uncertain.

INITIAL MANAGEMENT

Apart from the standard trauma assessment, the management of an elbow fracture dislocation should include evaluation of the shoulder and wrist

and a neurovascular examination. Skin integrity is assessed and open wounds are treated promptly with local wound care.

Radiographs of the shoulder, elbow, and wrist are obtained. Gentle traction views are obtained if the patient is reasonably comfortable. CT scans with 3-dimensional reconstructions are useful to understand the fracture.

If the ulnohumeral joint or radiocapitellar joint is grossly dislocated, reduction is recommended; but in some cases, the ulnohumeral joint will remain subluxated because of the fracture pattern and multiple attempts at reduction may not be beneficial. In either case, the limb is splinted until definitive treatment.

UNDERSTANDING THE INJURY

Radiographs and CT scans can be used to make a judgment about the overall stability of the elbow or

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Hand Clin 34 (2018) 75–83 https://doi.org/10.1016/j.hcl.2017.09.008 0749-0712/18/© 2017 Elsevier Inc. All rights reserved. forearm as well as the stability of the fractured bones.

Fractures of the proximal radius or ulna can involve instability of the ulnohumeral joint, proximal radioulnar joint (Monteggia fracture), or forearm (Essex-Lopresti).

Elbow fractures with ulnohumeral instability tend to occur in general patterns: (1) terrible triad, (2) varus posteromedial rotatory instability (VPMRI), (3) olecranon fracture dislocation (OFD), (4) radial head fracture with ulnohumeral dislocation, and (5) lateral column fracture of the distal humerus with ulnohumeral dislocation. A terrible triad consists of a fracture of the radial head, fracture involving the olecranon tip, and rupture of the lateral collateral ligament (LCL). VPMRI consists of a fracture of the anteromedial coronoid facet and rupture of the LCL. OFDs consist of a fracture of the olecranon with dislocation/subluxation of the intact forearm relative to the distal humerus. This is usually accompanied by a radial head fracture.

It is important to distinguish OFD from a Monteggia fracture. Monteggia described this fracture predating the discovery of x-rays, and the term Monteggia fracture or Monteggia variant has been used broadly to describe almost any ulna fracture with instability of the radiocapitellar articulation. Our practice has found it helpful to strictly define Monteggia fracture as a fracture of the proximal ulna with proximal radioulnar joint instability to improve our understanding and communication about elbow injuries. There is overlap between OFD and Monteggia fractures when there is a large degree of proximal ulna comminution.

An Essex-Lopresti lesion involves dissociation of the ulna from the radius. Usually, there is a fracture of the radial head proximally and a disruption of the distal radioulnar joint distally. The distal injury may also involve a distal radius fracture or intercarpal injury such as a perilunate dislocation.

ELEMENTS OF FRACTURE-INSTABILITY PATTERNS Coronoid

The shape and size of the coronoid fracture can help distinguish among the terrible triad, VPMRI, and OFD instability patterns.¹ O'Driscoll and colleagues¹ classified coronoid fractures into 3 types: tip, anteromedial facet, and base fractures. In general, coronoid tip fractures are associated with terrible triad injuries, coronoid anteromedial facet fracture with VPMRI injuries, and a coronoid base fracture is associated with OFD injuries.² In patients with a chronically subluxated elbow, the coronoid may erode and the instability of the elbow may become more difficult to address to restore stability.

Radial Head

Fractures of the radial head in the setting of ulnohumeral instability are generally more complex than isolated radial head or neck fractures. Duckworth and colleagues³ describe elbow injuries involving the radial head occurring in a "stable" or "unstable" setting.³ Stable injuries usually have an intact periosteum and are unlikely to displace, whereas unstable injuries occur with large soft tissue disruptions and gross mechanical instability of the elbow.

The area of the radial head that is injured can be larger than that identified on radiographs or even CT scan. When partial articular fractures occur in the unstable elbow, there is often comminution at the fracture margin.⁴ In addition, partial articular fractures tend to occur in the anterolateral portion of the radial head, an area important for biomechanical stability.⁵

Collateral Ligament Injury

Both collateral ligaments are injured in simple acute elbow dislocations (dislocations without fracture). In an unstable elbow fracture dislocation, the LCL is frequently avulsed from its origin on the lateral epicondyle. The medial collateral ligament (MCL) is likely injured in most cases, but there is some debate whether proximal avulsion or mid-substance injury is more frequent.^{6–8}

In comminuted OFDs, the distal attachment site of the LCL (cristae supinatoris) or the MCL (sublime tubercle) may be fractured from the shaft of the ulna. In these injuries, the proximal origin of the ligaments is usually intact.

SURGICAL PLANNING

Timing of surgery depends on associated injuries, the health of the soft tissue envelope, and availability of resources/implants. Surgery before 2 weeks is preferred, but if a delay is necessary, it is better to optimize resources and have complete preparations rather than perform surgery earlier. Patients who undergo surgery after approximately 2 weeks may benefit from additional stabilization using an external fixator, internal hinge, or pinning the joint to help protect the repaired structures. Outcomes are inferior when definitive treatment occurs after approximately 6 weeks because of soft tissue, bone, and cartilage changes.⁹

Patients may be positioned supine with a bump over the chest or an arm holder, lateral, or prone. If Download English Version:

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